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## Asymptomatic Migration of Ventriculoperitoneal Shunt Tube through the Anus

Amer Hashim Al-Ani<sup>1\*</sup>,  
Mariam Eisa Alhosani<sup>2</sup> and  
Kholoud Mohammed  
Aljabberi<sup>2</sup>

Department of General Surgery, Sheikh Khalifa Medical City, Ajman, United Arab Emirates.

### Corresponding author:

Amer Hashim Al-Ani

✉ ameralqadi2002@yahoo.com

Department of General Surgery, Sheikh Khalifa Medical City, Ajman, United Arab Emirates.

Tel: +971 56 262 3722

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### Abstract

**Introduction:** Hydrocephalus is caused by the inability of Cerebrospinal Fluid (CSF) to drain into the bloodstream. Ventriculoperitoneal shunt (VP shunt) is used frequently in the treatment of Hydrocephalus. VP shunt complications are common.

**Case presentation:** A 4-year-old girl had VP shunt at the age of one year. Her mother noticed a tube protruded through her anus and brought her to the emergency department. Laparotomy revealed the VP shunt tube inside the peritoneal cavity. Its distal end penetrated the recto-sigmoid junction and passed into the anus. The penetrating part of the shunt was cut and removed. The perforated bowel was repaired.

**Discussion:** VP shunt is a commonly performed procedure. It is associated with a high rate of complication. The incidence of bowel perforation with protrusion of VP shunt per anus is a rare complication. This complication is serious.

**Conclusion:** Migration of VP shunt tube through the anus is rare. It may happen without symptoms. It can be prevented by proper technique and length of tube. The proper treatment is removal of the migrated part and closure of the perforated bowel by laparotomy or laparoscopy.

**Keywords:** Ventriculoperitoneal shunt; Complications; Bowel perforation; Case report

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### Introduction

The cerebrospinal fluid shunt is a device implanted surgically in a CSF containing space to divert the excess fluid in a controlled manner to any distal compartment that can absorb CSF such as the pleura, atrium and peritoneum, being the later most favored. The shunting system is composed of a shunt valve, distal catheter, proximal catheter (ventricular catheter) and some accessories such as connectors and reservoirs (shunt chambers) [1].

A Shunt is known to be used as a treatment for many neurosurgical cases including hydrocephalus, it is a very effective way to reduce cerebrospinal fluid accumulation within brain ventricles which help save the patient from serious brain damage that can lead to mental retardation in pediatrics age group [2].

Complications of VP shunts are common and reaches up to 47%

[3]. Shunts can carry the risk for infections such as meningitis, ventriculitis and sepsis, leakage of CSF fluid at puncture site, rapid shunting of the fluid can lead to ventricular collapse, bleeding, and abdominal complications such as volvulus, pseudocyst and extrusion of the tube through viscus, heart, vagina and scrotum [2,4]. In this case report we are presenting a rare complication of the cerebral shunt; it is a case of a 4 years old female patient in which the distal end of the shunt has migrated and extruded through the anus.

### Case Presentation

A 4 years old female, a known case of encephalocele for which a Shunt was placed at the age of 1 year, was brought to the emergency department with a small tube coming out of her anus that was found accidentally, the patient was asymptomatic. The diagnosis was perforated anus due to VP Shunt.

On examination, patient was vitally stable, alert and oriented, systemic and focused abdominal examination were unremarkable except for the protruding tube through the anus, with no discharge of blood, or fecal matter.

Plain X-ray showed long Shunt tube that is forming a loop and is protruding through the rectum into the anus, no signs of bowel obstruction (**Figure 1**), distal end of the shunt tube is emerging from the anus (**Figure 2**). CT brain was done and showed the proximal position in the brain (**Figure 3**).

Laparotomy was performed, VP shunt tube was found inside the peritoneal cavity surrounded and fixed by adhesions (**Figure 4**), the shunt herniated into the lower part of sigmoid colon through the rectum and passing into anus, the shunt was cut near the perforated site of the bowel then pulled outside from the anus, the perforated bowel wall was repaired.

## Discussion

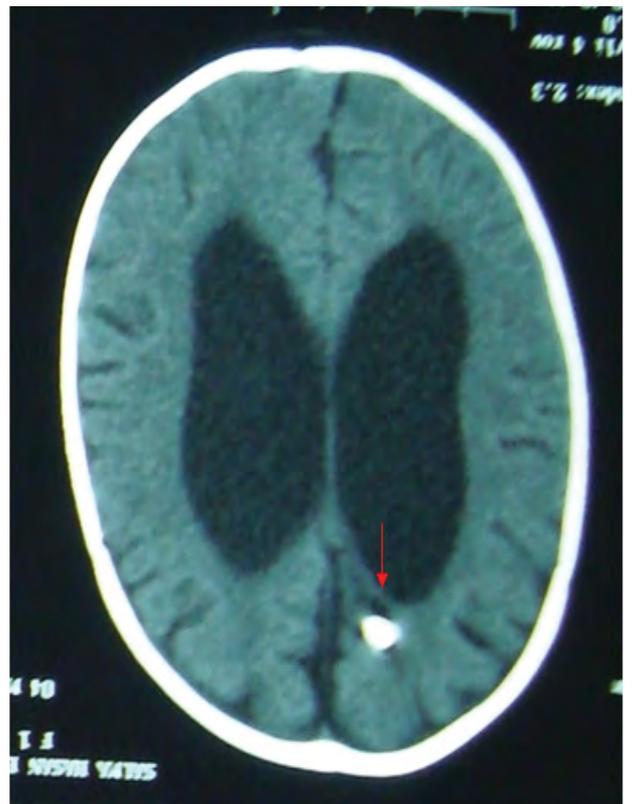
A 30,000 Shunt procedures are performed every year in United States; however, the complications rate is high [5]. Shunt migration and invasion through many organs is possible and is reported in many case reports. They include intrusion through stomach wall, bowel, liver, chest, jugular vein, vagina, scrotum



**Figure 2** Distal end of shunt tube protruding through the anus.



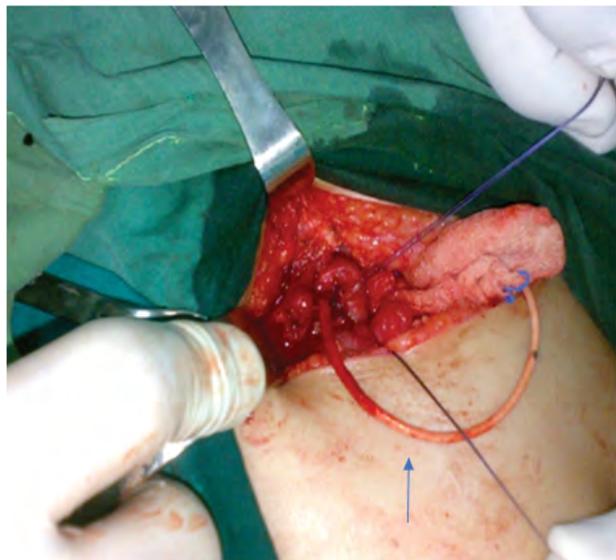
**Figure 1** Plain thoraco-abdominal X-ray showing VP shunt forming a loop.



**Figure 3** Proximal end of the shunt on CT brain not displaced.

and anus which is the most common presentation of them all [5,6]. The occurrence of bowel perforation due to Shunt is rare with an incidence between 0.1-1%, and commonly involving stomach and colon [7].

In a retrospective cohort study in the USA, results showed that



**Figure 4** Transverse abdominal incision showing the shunt tube within peritoneal cavity.

at least one complication of VP shunt has occurred in 23.8% of patients, most of them occurred within the first year after surgery at a rate of 21.3, 5.7% in the second year and 2.5 in the fifth year after VP shunt placement [8].

Possible presentations of bowel perforation due Shunts are vomiting, abdominal pain and fever, but more than 50% of cases are asymptomatic and discovered once the shunt tube is extruded through the anus, other presentations such as abdominal abscess and peritonitis are less common presentations [9].

Many factors facilitate shunt migration and protrusion have been found. They include: Thin walled bowel in children especially if the child is a known case of myelomeningocele; where the bowel innervation is or may be insufficient [5], history of previous surgery, infection such as tuberculosis (TB) [10], chronic irritation by the shunt, sharp ended shunt, silicone allergy [11], encasing fibrosis around the catheter, mini-laparotomy and laparoscopic-assisted insertion of the shunt [9], the continuous water hammer effect of CSF pulsation on the tube [10].

Many hypotheses have been put to explain the physiology and the cause of this complication. One of which is the frictional force of the tube against the omentum at site of bowel perforation, it is said that the stiffer the tube is the more chance of it to be entangled in the omentum and erode the bowel wall [5]. Another hypothesis believes that the fibrous adhesions and the inflammatory reaction that form around the distal end of the catheter have an anchoring effect leading to pressure on the bowel wall that weakens it and eventually end up with perforation [4,10]. The length of the catheter can also be a cause; the longer the abdominal portion of the tube the more chance of it to be pressurized on the bowel and cause perforation. The child's age and the fact that he or she will grow and will need an extra length of the tube have to be taken in consideration [4]. Malnutrition

and previous abdominal surgery can lead to formation of fibrosis which can aid the migration process.

The management of VP shunt migration is different from patient to patient and is affected by certain factors such as if the patient developed meningitis, if there is local infection around the shunt and if the shunt is still functioning. In all of the scenarios the management will start by a course of broad-spectrum intravenous antibiotics and drainage of pus collection if any [10]. After the patient is stabilized, surgery is the ultimate management for those cases, and it is done by removing the herniated part and closing the perforation site or leaving it to close by itself as suggested by older researches. This is done either by laparotomy which is more favored if the patient was suspected to have peritonitis, by cutting the distal end and pulling out the rest from the anus. Another way is to do it laparoscopically by cutting the herniated part from the inside of the anus and then repairing the perforated wall [12].

Some of the risk factors for VP shunt migration like "Thin walled bowel" in children, history of previous surgery, infection, chronic irritation by the shunt, silicone allergy, encasing fibrosis around the catheter and the continuous water hammer effect of CSF pulsation on the tube are unavoidable, yet avoiding the use of sharp end and the use of proper length of the shunt may aid in preventing this complication.

## Conclusion

Extrusion of distal portion of shunts through the bowel is a rare complication. It can be fatal if infections and sepsis developed. Risk factors and etiologies of this complication are unclear with several hypotheses. Management plan usually include antibiotics, removal of the herniated part then closure of the perforated viscus. The rational beyond reporting this case is that despite being rare, one must put it in consideration, and try to avoid it.

## Learning Points

- VP shunt complications are common.
- Migration of VP shunt tube through the anus is rare and serious complication.
- It happens due to sharp edges, stiff material of the tube, adhesions and inflammation.
- Most cases of migration of VP shunt tube are asymptomatic; surgery is the mainstay of treatment.

## Informed Consent

A written consent was taken from the family of the child.

## Conflict of Interest

Authors declare no conflict of interest.

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